

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁴ : E05F 5/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 89/ 02509</p> <p>(43) International Publication Date: 23 March 1989 (23.03.89)</p>
<p>(21) International Application Number: PCT/AU88/00354</p> <p>(22) International Filing Date: 9 September 1988 (09.09.88)</p> <p>(31) Priority Application Number: PI 4299</p> <p>(32) Priority Date: 11 September 1987 (11.09.87)</p> <p>(33) Priority Country: AU</p> <p>(71)(72) Applicant and Inventor: HARRISON, Brian, Dennis [AU/AU]; 11 Lower Fort Street, Dawes Point, NSW 2000 (AU).</p> <p>(72) Inventor; and</p> <p>(75) Inventor/Applicant (for US only) : WOOD, Noel, Sydney, Davidson [AU/AU]; Nielsen Design, 33 Alexandra Street, Hunters Hill, NSW 2110 (AU).</p> <p>(74) Agent: F.B. RICE & CO.; P.O. Box 117, Balmain, NSW 2041 (AU).</p>		<p>(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.</p> <p>Published With international search report.</p>
<p>(54) Title: DOORSTOP</p> <p>(57) Abstract.</p> <p>A doorstop (25) to prevent the opening of a door. The doorstop (25) includes a leg (30) which is held flush against the door (33) by foot (31) which fits under the door edge, a strut (32), the upper end of which is hingedly attached to the leg (30) with a floor engaging means (39) at the lower end of the strut (32). The strut (32) is made up of two detachable arms (34, 40). Lower arm (40) may be detached from upper arm (34) and rotated through 180° and re-attached to the upper arm, in order to choose an appropriate floor engaging means (39) at the lower point of lower arm (40).</p>		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	ML	Mali
AU	Australia	GA	Gabon	MR	Mauritania
BB	Barbados	GB	United Kingdom	MW	Malawi
BE	Belgium	HU	Hungary	NL	Netherlands
BG	Bulgaria	IT	Italy	NO	Norway
BJ	Benin	JP	Japan	RO	Romania
BR	Brazil	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	LI	Liechtenstein	SN	Senegal
CH	Switzerland	LE	Sri Lanka	SU	Soviet Union
CM	Cameroon	LU	Luxembourg	TD	Chad
DE	Germany, Federal Republic of	MC	Monaco	TG	Togo
DK	Denmark	MG	Madagascar	US	United States of America
FI	Finland				

- 1 -

"DOOR STOP"TECHNICAL FIELD

This invention relates to a removable door stop which is easily disassembled for storage and is more specifically concerned with one having parts moulded from synthetic plastics materials such as thermo-setting and thermo-plastic organic compounds, fibre glass, and carbon-fibre reinforced moulded materials.

BACKGROUND ART

Many designs of removable door stop have been developed. They have one main problem. Most are made of metal. The advantage of constructing them of metal is that they are strong and articulated joints can be made by using metal pivot pins. A disadvantage of using metal is that it is relatively heavy and requires a large number of separately fabricated parts for its construction.

A further disadvantage of the prior art is that they are most usually constructed so as have at least some components permanently attached to the door or the floor. This is clearly unsightly and in some cases can be quite dangerous.

Lastly most prior art devices are not able to be disassembled. They are constructed so that the components are permanently fixed together which not only makes storage and use difficult, but rarely allows these prior art devices to adapt to varying conditions of door height and/or floor condition.

Preferred embodiments of this invention provide a light door stop of simple construction, capable of being easily disassembled, adaptable to different environments of use and easy to store when not in use.

DISCLOSURE OF INVENTION

In accordance with a first aspect the present invention comprises a doorstop comprising a leg for standing against a lower face of the door, a foot on the

- leg for inserting beneath an under edge of the door, a floor engaging portion having surfaces for engaging the floor in a slip-free manner at a distance spaced from the leg in the direction of opening of the door, an
- 5 articulated strut hinged about a horizontal axis to the leg to allow movement of the strut towards the door and in a plane transverse to the plane of the door, the strut having the floor engaging portion at its lower end and comprising two arms moulded from synthetic plastics
- 10 material and attachably connected to one another by a hinge formed by a cylindrical member or trunnion provided at one end of one arm and which is removably inserted into an accommodating part-cylindrical recess provided in the adjacent end of the other arm, the hinge axis being
- 15 parallel to the hinge axis at the top of the strut and a formation on one of the arms abutting the other arm to limit its movement towards the door after it has just passed through a "dead-centre" position at which the longitudinal axes of the two arms are in alignment.
- 20 Preferably both hinges are formed by trunnions respectively snap-fitted into complementary part-cylindrical sockets and the material used to define the sockets is sufficiently resilient to permit the trunnions to be withdrawn from their sockets by a sharp
- 25 manual tug.
- The door stop may have all of its components made from synthetic plastics material if desired.
- Conveniently the trunnions are provided with end caps which prevent axial displacement of the trunnions in their
- 30 respective sockets. Although it is preferred to locate the trunnions in their sockets by snap-fitting, it is within the scope of the invention for a trunnion to be inserted into its recess by being slid in from one end of the socket and a stop to be then applied to prevent the
- 35 trunnion sliding out of the socket inadvertently.

In a further embodiment, the horizontal axis of the hinge between the strut and the leg is movable along at least part of the leg. In a particularly preferred embodiment, the leg of the doorstop of the present
5 invention, includes a member which is selectively slidable along at least part of the leg, with the strut being hinged to this member. According to these particular embodiments therefore, the height of the gap between the floor and the bottom of the door can be compensated for,
10 since the point at which the strut hinges on the leg can be raised or lowered accordingly.

To increase the stability of this member in the leg, the member may also have a locking surface which is adapted to engage with a complimentary surface on said
15 leg, to thereby retain the member and the leg in a desired relative position.

Given that the doorstop may be used on several types of floors, adaptability of the floor engaging means to these different types of floors would also provide certain
20 advantages. It is envisaged therefore that another embodiment of the floor engaging means of the doorstop may include a first means for engaging carpeted floors, for example a serrated or spiked means and a second means for engaging a bare floor, for example a pad of resilient
25 material, e.g. rubber.

In order to change the floor engaging means, the lower arm of the strut may be unhinged from the upper arm and rotated through 180° about its longitudinal axis, from a first position to a second position, and then
30 rehinged to the upper arm. This allows a different floor engaging means to be chosen by the user of the doorstop due to the fact that in a first position of the lower arm the first means, e.g. serrated or spiked means, engages with the floor and in a second position of the lower arm
35 the second means, e.g. resilient pad, engages the floor.

BRIEF DESCRIPTION OF DRAWINGS

The invention will now be described in more detail, by way of example, with reference to the accompanying diagrammatic and informal drawing in which:-

5 FIGURE 1 is a side elevational view of a first embodiment of a door stop according to the invention in place against a lower face of a door to resist its opening movement in the direction of the stop;

10 FIGURE 2 is an exploded elevational view of a strut forming a component of the door stop and as viewed in the direction of the arrow "A" in Figure 1;

FIGURE 3 is a side elevational view of the exploded strut of Figure 2 as it would be viewed in the direction of the arrow B in Figure 2; and

15 FIGURES 4(a) and (b) are respectively a side elevational view and a face elevational view of a flattened hook component providing a leg to the door stop of Fig. 1.

20 FIGURE 5 is a partly cut-away side elevational view of a second embodiment of a door stop according to the invention during positioning on a door;

FIGURE 6 is a partly cut away side elevational view of the door stop of Figure 5 when in use or in a "locked position".

25 BEST MODE FOR CARRYING OUT THE INVENTION

Figure 1 shows a lower portion 1 of a door as viewed from its closing vertical edge remote from its hinge. It is held against opening in the direction of an arrow "C" by a strut 2 forming part of the door stop.

30 The door stop comprises a flat mild steel leg 3 having its ends hooked at 4 and 5 towards opposite sides of the leg. The lower hooked end 4 fits beneath the underside of the door. The upper hooked end 5 is moulded into a plastics connector 6 providing a cylindrical
35 hinging recess 7 having an opening of slightly less than

- 5 -

180°. The leg 3 may, if preferred, be integrally moulded with the connector from a tough and resiliently-deformable plastics material.

The recess 7 forms a cylindrical socket for a trunnion bearing 9 integrally moulded with an upper arm 8 of the strut 2 from a plastics material. End caps 10 prevent axial displacement of the trunnion 9 when snap-fitted or slid into the recess 7 to confine movement of the strut 2 to the plane of the leg 3.

The lower portion of the upper arm 8 is provided with a nose 12 and a second part-cylindrical socket 13 also having an open mouth of slightly more than 180°.

The lower portion of the strut 2 is provided by a lower arm 15 having a cylindrical trunnion bearing 16 at its upper end shaped to be snap-fitted into the recess 13. Caps 17, shown in Figure 2, are provided at opposite ends of the trunnion bearing 16 and prevent it moving axially in the recess 13. Opposite faces 18 of the lower arm 15 provide flats which are selectively engageable with the underside of the nose 12 when the strut is moved just past a "dead-centre" position at which when the two arms 8, 15 are axially aligned.

The lower end of the arm 15 is provided by an integrally moulded pad 20 having two perpendicular faces 21 and 22. The face 21 is spiked at 23 for engaging in a pile of a carpet to prevent movement of the pad 20 along it, and the other face 22 is provided with a serrated rubber pad 24 to prevent the pad slipping along a hard floor. The two trunnion hinges provided respectively at the upper end and middle of the strut 2 can each be disconnected by sharply tugging the trunnion out of the socket recess which accommodates it. The plastics material used for the strut and connector is one which is sufficiently resilient to enable this to occur. When either of the hinges has been disconnected, the arm 15 can

- 6 -

be turned around its axis to bring one or other of the faces 22,23 into engagement with the floor.

As the door stop is made largely or wholly from a moulded plastics material, it is light. As it has few
5 moving parts it can be cheaply constructed. As the parts are interconnected by being snap-fitted into one another, assembly and disassembly of the door stop is easy.

To use the door stop, the leg 3 is placed against the lower inside door face and its lower end 4 is hooked
10 around the door under edge. The two arms of the strut 2 are snap-fitted together and the upper end of the upper arm 8 is snap-fitted into the recess 7 with the desired face 21 or 22 of the pad 20 facing down.

The pad 20 is moved towards the door until the
15 strut 2 is nearly straight. Hand pressure is then applied to the nose 12 to move the two arms 8,15 of the strut past the "dead-centre" position. The strut is then in a state of compression forcing the door to the closed condition, and the nose 12 engaging the face 18.

20 Opening of the door is resisted by the strut 2. Upward movement of the leg is prevented by its hooked lower end engaging beneath the underside of the door.

To remove the door stop, upward pressure is applied by hand to the underside of the strut 2 in the vicinity of
25 the nose 12 to move the arms 8,15 back through the "dead-centre" position. The pad 20 can then be lifted off the ground and the leg removed from the door.

The three components of the door stop can be stored alongside one another so they occupy very little space
30 when not in use.

With reference to the further embodiment disclosed in Figures 5 and 6, the door, once again, is held against opening in the direction "C".

In this embodiment, the doorstop 25 comprises leg 30,
35 foot 31 and strut 32. Foot 31 hooks underneath the lower

- 7 -

edge of the door 33. Foot 31 is of L-shape with the vertical side of the foot 31 turned over so as to form a clamp which holds the lower portion of the leg 30 flush against the door. The upper end of the strut 32 is
5 hingedly connected to the leg 30.

The strut is formed with upper arm 34 and lower arm 40 hingedly connected via part-cylindrical socket 37 on the upper arm which receives trunnion bearing 38 of the lower arm. The upper arm 34 has a nose portion 36 which
10 projects downwardly towards the lower end of the strut.

The lower end of lower arm 40 is formed as floor engaging means 39. In this case the floor engaging means includes resilient pad 42, for engaging with a bare floor, and serrated or spiked face 41, for engaging with a
15 carpeted floor.

The major difference between the embodiment of Figures 1 to 4 and the embodiment of Figures 5 to 6 is the way in which the strut 32 is hinged to leg 30. In this particular embodiment the horizontal axis about which the
20 strut is hinged to the leg is movable along at least part of the leg.

This movement of the horizontal axis in relation to the leg may be achieved in several ways, however in this particular embodiment this movement is accomplished by
25 means of a member 50 which is slidably connected to leg 30.

This member 50 is formed with guide lugs 52 which run into and are limited by, guide apertures 56 formed in leg 30. In this way the member 50 can only move within the boundaries of the leg set by these guide apertures.

30 Member 50 is also formed with trunnion bearing 51 which cooperates with part-cylindrical socket 55 in the upper arm 34, such that the strut 32 is hingedly attached to the leg 30 via slidable member 50.

Once the leg and foot are in place, the leg 30 is
35 held by gripping apertures 57, flush against the door.

- 8 -

The nose portion 36 of upper arm 34 is then brought to a substantially horizontal orientation and lower arm 40 is drawn away from the leg with the pad 39 being placed an appropriate distance away from the door. As this is done member 50 falls from its "parked position" (Figure 5) to its "locking position" (see Figure 6) and locking surface 53 of member 50 mates with a receiving surface 61 of leg 30. Stabilising arm 54 ensures that locking surface 53 mates evenly along its length with receiving surface 61.

Hand pressure, now applied to the nose portion 36 of upper arm 34, will then force the upper and lower arms of the strut past the "dead-centre" position and lock the doorstop against the door and the floor. As in Figures 1 to 4, the strut 32 of Figure 5 is now in a state of compression, forcing the door to a closed condition with the nose 36 adjacent the lower arm 40. The member 50 cannot move due to the mating between locking surface 53 and receiving surface 61.

To release this second type of doorstop 25, the nose portion 36 need merely to be lifted and the locking surface and pad are freed. Once the doorstop is released, the lower arm 40 can be slid out from upper arm 34 rotated through 180° and slid back into upper arm 34. In this way either engagement means 42 or 41 can be selected depending upon which will give better grip on the floor. For example in Figure 6 the engagement means 42 would be used for a bare, uncarpeted floor. Rotation through 180° about its longitudinal axis of lower arm 40 would bring engagement means 41 into contact with the floor, which would be used for carpeted flooring.

In the previously described embodiment of Figures 1 to 4, the higher the gap between the bottom of the door and the floor, the more vertical becomes the strut. Alternatively the strut can be made longer and therefore

more angled to the vertical plane. However, clearly one strut and one leg and foot of the embodiment in Figures 1 to 4 cannot be used for doors with widely divergent gaps between the underside of the door and the floor.

5 The advantage of this second embodiment of Figures 5 and 6 over the first embodiment of Figures 1 to 4 is as follows. The leg 30 is positioned against the door with foot 31 under the lower edge of the door 33. If the lower edge of the door 33 is relatively high off the floor, the
10 use of the previous embodiment of the door stop (see Figures 1 to 4) would cause the strut to be near vertical and due to this the stopping action would not be effective due to slippage of the pad and in a worst case the strut would not contact the floor at all.

15 A further advantage can be seen from Figure 5 which shows that all components can be received within leg 30 thereby ensuring easy and neat storage. Conversely screw hole 62 can receive a screw, which permanently fixes the leg 30 of the door stop to the door 33 such that when the
20 sheet 32 is not in use it is really received by leg 30.

- 10 -

CLAIMS:-

1. A doorstop comprising a leg for standing against a lower face of the door, a foot on the leg for inserting beneath an under edge of the door, a floor engaging portion having surfaces for engaging the floor in a slip-free manner at a distance spaced from the leg in the direction of opening of the door, an articulated strut hinged about a horizontal axis to the leg to allow movement of the strut towards the door and in a plane transverse to the plane of the door, the strut having the floor engaging portion at its lower end and comprising two arms moulded from synthetic plastics material and attachably connected to one another by a hinge formed by a cylindrical member or trunnion provided at one end of one arm and which is removably inserted into an accommodating part-cylindrical recess provided in the adjacent end of the other arm, the hinge axis being parallel to the hinge axis at the top of the strut and a formation on one of the arms abutting the other arm to limit its movement towards the door after it has just passed through a "dead-centre" position at which the longitudinal axes of the two arms are in alignment.
2. A doorstop, as claimed in claim 1, wherein the horizontal axis of the hinge between the strut and the leg is movable along at least a part of the length of the leg.
3. A doorstop, as claimed in claims 1 or 2, wherein the leg incorporates a member selectively slidable along at least a part of the length of said leg, such that said strut is hinged, about a horizontal axis, to said member.
4. A doorstop, as claimed in claim 3, wherein said member has a locking surface which is adapted to engage with a complimentary surface on said leg, to thereby retain said member and said leg in a desired relative position.
5. A doorstop, as claimed in any one of the preceding

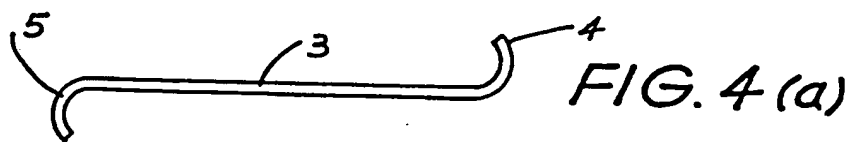
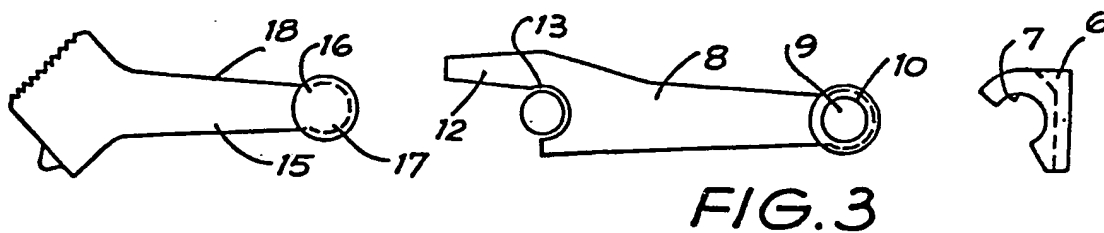
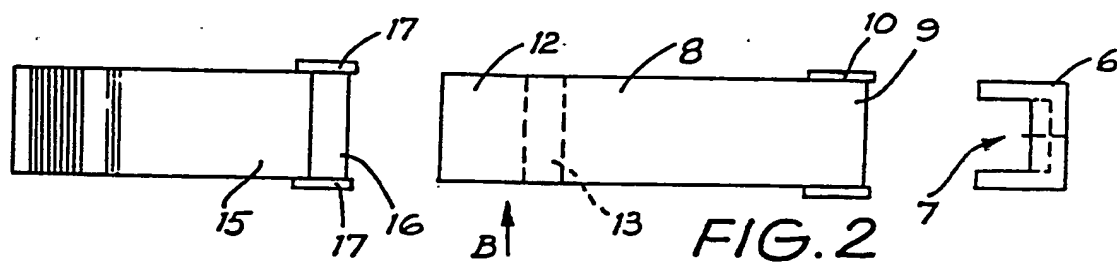
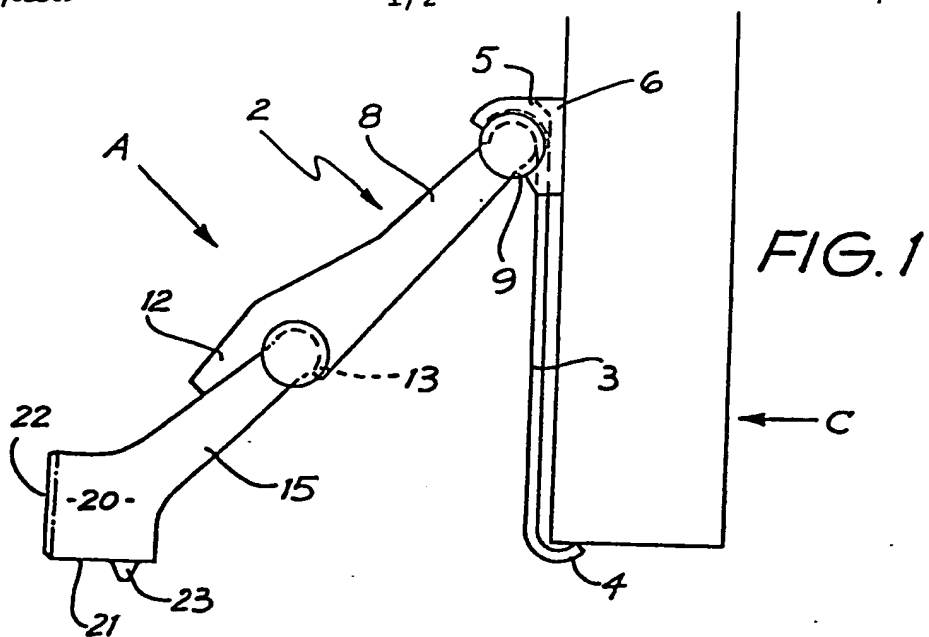
- 11 -

claims, wherein the floor engaging portion on the lower arm of the strut includes a first serrated or spiked means for engaging with a carpeted floor and a second resilient pad means for engaging with a bare floor.

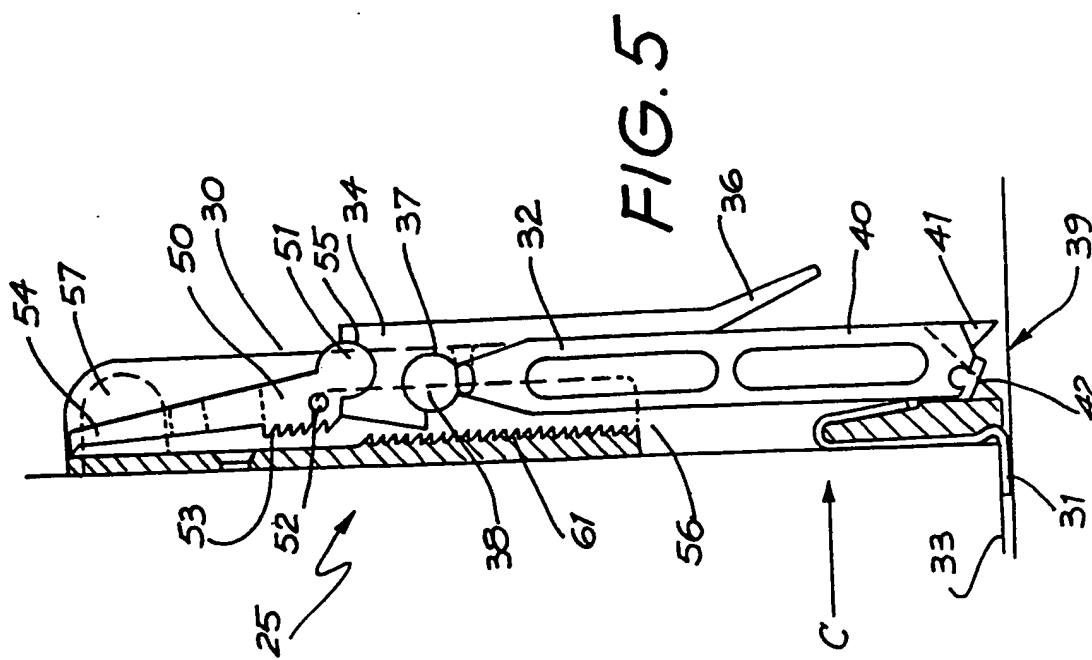
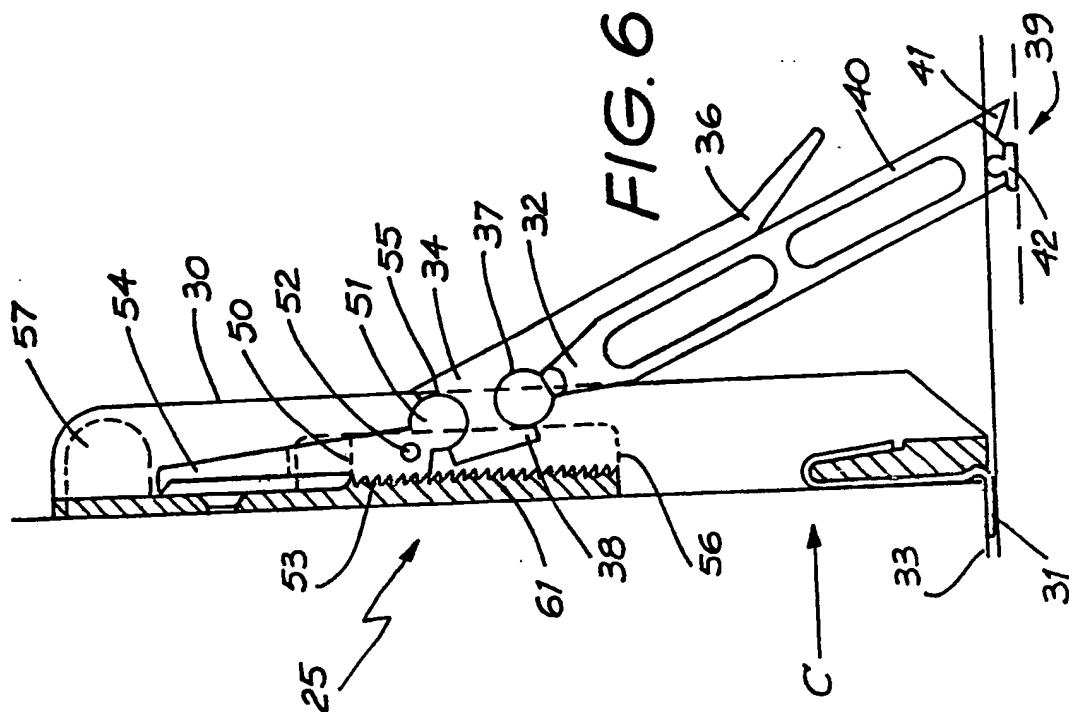
6. A doorstop, as claimed in claim 5, wherein said lower arm in a first position may be moved to a second position by unhinging said lower arm from said upper arm, rotating said lower arm through 180° about its longitudinal axis and rehinging said lower arm to said upper arm, such that said first serrated or spiked means engages a floor when said lower arm is in the first position and said second resilient pad means engages a floor when said lower arm is in the second position.

7. A doorstop, as claimed in any one of the preceding claims, wherein said leg is manufactured from synthetic plastics material.

8. A doorstop as claimed in any one of the preceding claims wherein all components of said doorstop except the foot are manufactured from synthetic plastics material.



2/2



INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 88/00354

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) * According to International Patent Classification (IPC) or to both National Classification and IPC Int. Cl. ⁴ E05F 5/00																	
II. FIELDS SEARCHED Minimum Documentation Searched * <table border="1"> <tr> <th>Classification System</th> <th>Classification Symbols</th> </tr> <tr> <td>IPC</td> <td>E05F 5/00</td> </tr> </table> Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched * AU : IPC as above			Classification System	Classification Symbols	IPC	E05F 5/00											
Classification System	Classification Symbols																
IPC	E05F 5/00																
III. DOCUMENTS CONSIDERED TO BE RELEVANT * <table border="1"> <tr> <th>Category *</th> <th>Citation of Document, ** with Indication, where appropriate, of the relevant passages 12</th> <th>Relevant to Claim No. 13</th> </tr> <tr> <td>A</td> <td>US,A, 3809419 (CHEZEM) 7 May 1974 (07.05.74)</td> <td></td> </tr> <tr> <td>A</td> <td>US,A, 3116946 (DELOUME) 7 January 1964 (07.01.64)</td> <td></td> </tr> <tr> <td>A</td> <td>US,A, 2988392 (KUO) 13 June 1961 (13.06.61)</td> <td></td> </tr> <tr> <td>A</td> <td>AU,B, 34995/50 (145334) (GENERAL MOTORS CORP) 17 August 1950 (17.08.50)</td> <td></td> </tr> </table>			Category *	Citation of Document, ** with Indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13	A	US,A, 3809419 (CHEZEM) 7 May 1974 (07.05.74)		A	US,A, 3116946 (DELOUME) 7 January 1964 (07.01.64)		A	US,A, 2988392 (KUO) 13 June 1961 (13.06.61)		A	AU,B, 34995/50 (145334) (GENERAL MOTORS CORP) 17 August 1950 (17.08.50)	
Category *	Citation of Document, ** with Indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13															
A	US,A, 3809419 (CHEZEM) 7 May 1974 (07.05.74)																
A	US,A, 3116946 (DELOUME) 7 January 1964 (07.01.64)																
A	US,A, 2988392 (KUO) 13 June 1961 (13.06.61)																
A	AU,B, 34995/50 (145334) (GENERAL MOTORS CORP) 17 August 1950 (17.08.50)																
<p>* Special categories of cited documents: 10</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p>																	
IV. CERTIFICATION <table border="1"> <tr> <td> Date of the Actual Completion of the International Search 5 December 1988 (05.12.88) </td> <td> Date of Mailing of this International Search Report 15 DECEMBER 1988 (15.12.88) </td> </tr> <tr> <td> International Searching Authority Australian Patent Office </td> <td> Signature of Authorized Officer David Lee DAVID LEE </td> </tr> </table>			Date of the Actual Completion of the International Search 5 December 1988 (05.12.88)	Date of Mailing of this International Search Report 15 DECEMBER 1988 (15.12.88)	International Searching Authority Australian Patent Office	Signature of Authorized Officer David Lee DAVID LEE											
Date of the Actual Completion of the International Search 5 December 1988 (05.12.88)	Date of Mailing of this International Search Report 15 DECEMBER 1988 (15.12.88)																
International Searching Authority Australian Patent Office	Signature of Authorized Officer David Lee DAVID LEE																

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 88/00354

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Members			
US	3809419	CA	979612	GB	1387788

END OF ANNEX

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☒ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☒ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☒ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.